The majority of samples had radionuclide concentrations above their MDC (Table 4-6). While tritium concentrations in tunnel effluent were elevated, they were about 29 percent lower than the limit allowed under permit NEV 96021 for that discharge system (Table 4-5). Tritium was found in all pond inlet and pond water samples at concentrations slightly lower than the previous two years' samples (Figure 4-11). Most pond water samples had tritium concentrations very close to those in tunnel effluent, but there have been measurements of tritium in pond water much lower than the tunnel effluents (Figure 4-11). This is likely due to precipitation events that dilute the original tritium concentrations. Concentrations of ^{90}Sr, ^{137}Cs, plutonium, and ^{241}Am were at levels comparable with the past two years. Uranium was not detected in samples collected during 2004.

Due to the elevated concentrations of radionuclides in the E Tunnel containment ponds, the ponds are fenced and posted with radiological warning signs. Given that the ponds are available to wildlife, animals are also sampled under RREMP monitoring to assess potential radiological doses to wildlife and to humans consuming game animals (see Section 7.0 and Section 8.0).

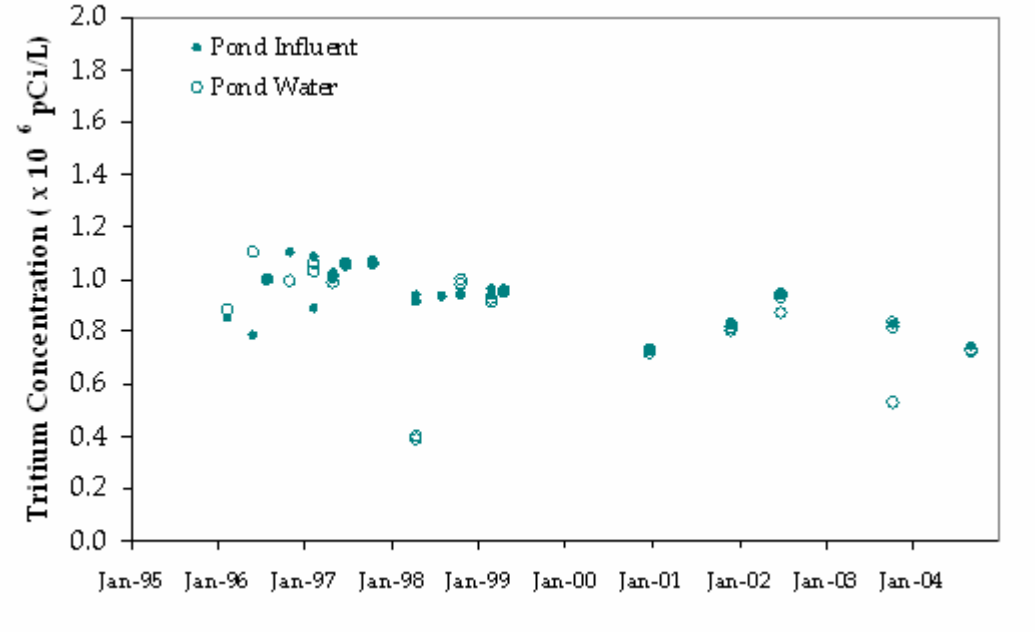

Figure 4-11. Tritium concentration in E Tunnel Ponds from 1995 – 2004

4.1.9 Results from NTS Sewage Lagoons

Each sewage lagoon at the NTS is part of a closed system used for the evaporative treatment of sanitary sewage. Sewage storage and treatment at the NTS has transitioned from lagoons to septic systems at several locations in recent years. Two permitted sewage lagoons remain: Area 6 Yucca and Area 23 Mercury (A23) (see Figure 4-3). The permits for these lagoons do not require that the water or sediments be monitored for radioactivity (see Section 4.2.4). However, to more completely demonstrate the proper management of effluents on the NTS, limited radiological analyses are conducted for these lagoons under the RREMP (DOE, 2003b).

The lagoon water samples were analyzed for tritium using standard (un-enriched) analyses and by gamma spectroscopy for other radionuclides. No tritium was detected at concentrations above MDCs in the lagoon water samples (Table 4-7) and no man-made gamma-emitting radionuclides were detected.

Table 4-7. Tritium water monitoring results for NTS sewage lagoons in 2004

Monitoring Location	Date Sampled	^{3}H ± Uncertainty[(a)] (MDC) (pCi/L)
Area 23 Mercury	1/13/2004	-115 ± 172 (290)
	4/6/2004	134 ± 166 (278)
	7/7/2004	-27 ± 197 (358)
	10/26/2004	-29 ± 121 (210)
Area 6 Yucca	1/13/2004	-98.1 ± 172 (290)
	4/6/2004	42.1 ± 165 (292)
	7/7/2004	-124 ± 185 (352)
	10/26/2004	-119 ± 118 (214)

(a) ± 2 standard deviations

4.1.10 UGTA Wells

The UGTA Project took custody of one new well drilled in 2004, U-19ad PS#1A. Groundwater from eight UGTA Project wells was sampled and analyzed in 2004 (Figure 4-12). A multi-agency team consisting of personnel from Stoller-Navarro Joint Venture (SNJV), Los Alamos National Laboratory (LANL), and LLNL collected samples at these wells using downhole sampling pumps. During sample collection, the field parameters temperature, pH, and conductivity were measured. Samples were then analyzed for selected radionuclides as well as gross alpha and gross beta. Well water data are maintained in the UGTA Project geochemical database by SNJV, Las Vegas, NV.

A tracer test for well ER-6-1 was conducted, and samples were obtained and analyzed from ER-6-1 and ER-6-1 #2 during the test. Well ER-6-2 was developed, tested, and sampled in 2004. Water samples from all of these UGTA wells contained no detectible tritium or man-made radionuclides.

Well RNM #1 was pumped and sampled in 2004. Analysis results are pending.

The UGTA Project sampled four post-shot/cavity wells ("Hot Wells") in 2004: U-3cn PS#2A; U-19ad PS#1A; ER-20-5 #1; and ER-20-5 #3 (Figure 4-12). The first two wells access test cavities from underground nuclear tests BILBY and CHANCELLOR, respectively. The two ER-20-5 wells were drilled near the TYBO test. Preliminary results show expected levels of radionuclides for post-shot wells. Sample tritium concentrations ranged from 113,000 pCi/L to 38,000,000 pCi/L (Table 4-8). Final laboratory analytical results for these wells are pending.

The results of well sampling will support the NNSA's continuing efforts to create a long-term monitoring program for wells in or near underground nuclear test cavities. The program objectives are to characterize the hydrologic source term and to evaluate the decay and potential migration of radionuclides through monitoring at or near the source.

Table 4-8. Tritium concentrations in UGTA hot wells sampled in 2004

Sump Water Source	^{3}H (pCi/L)
ER-20-5 #1	38,000,000
ER-20-5 #3	113,000
U-3cn PS #2A	7,900,000
U-19ad PS #1A	22,000,000

Source: Eaton, 2005 (personal communication)